

Honeywell

parallon 75®
TURBOGENERATOR POWER SYSTEM

**technically
driven**

**globally
focused**

**people
powered**



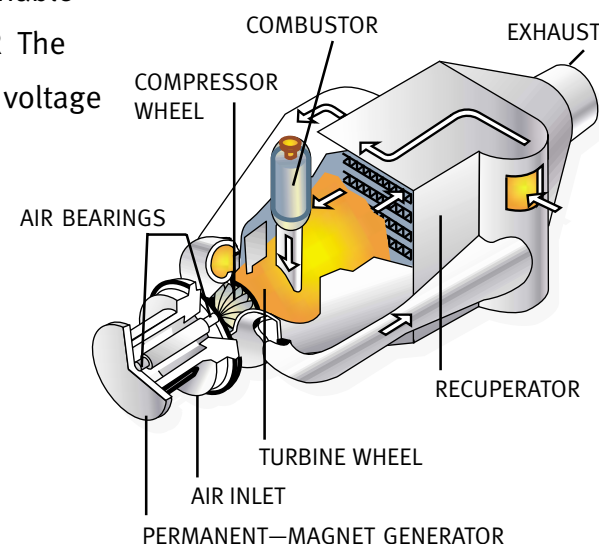
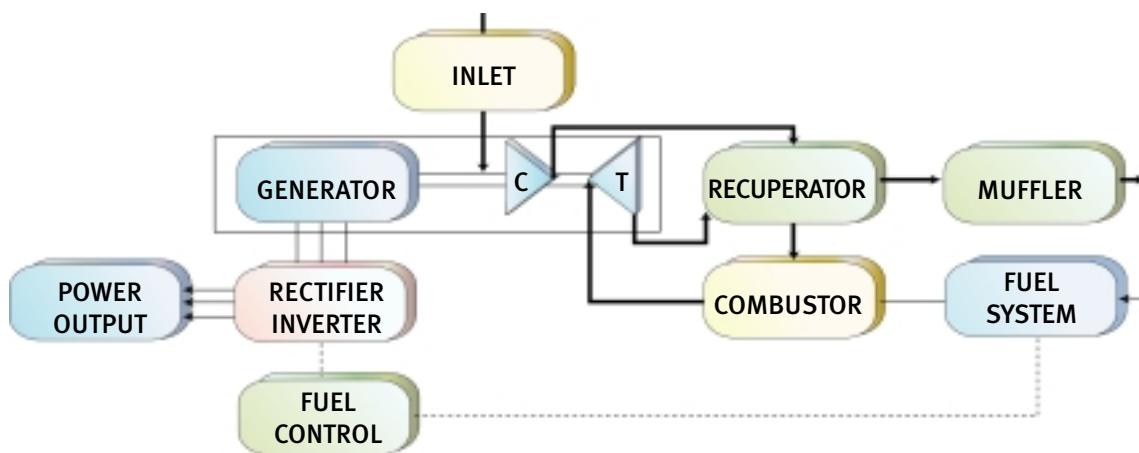
INLET Air enters the inlet through an outside vent. Through the inlet, filtered air enters a single-stage radial compressor. **COMPRESSOR** The air is compressed. **RECUPERATOR** The air enters the recuperator, which is a heat exchanger that adds heat to the compressed air using exhaust heat. **COMBUSTOR** Next, the air enters the combustor where it is mixed with fuel and heated further by combustion. **TURBINE** The hot pressurized air from the combustor passes through a single-stage radial turbine. The pressurized hot air spins the turbine and permanent-magnet generator. The turbine, compressor, and generator are all housed on a single shaft – the only moving part of the engine. Compliant air-foil bearings support the shaft on a thin film of air. There is no need for lubrication. The exhaust exits the turbine and enters the recuperator, where the inlet air from the compressor is pre-heated for the combustion cycle. **EXHAUST** The exhaust exits from the recuperator through the muffler at approximately 500 degrees F. **GENERATOR** The output of the generator is 3-phase variable frequency/variable voltage. This output is delivered to the inverter system. **INVERTER** The inverter converts variable frequency/variable voltage output to a fixed frequency/fixed voltage that provides electricity through a transformer to the end-user.

the Parallon 75

It delivers all the benefits of Parallel Power, economically, quietly, and reliably.



PARALLON 75 SYSTEM DIAGRAM





Load Sequencing (Aug 00)

Allows sequential step load application to maximize standby power capacity

Remote Control and Monitoring

Modem/ethernet interface with host software

Grid Fault Protection

No utility protective relays required*

Energy Management Interface

Open architecture for easy interface with other software

Load Following (Aug 00)

Closed loop utility meter controls to follow customer loads

Liquid Fuel (Nov 00)

Wide variety of diesel fuels and kerosene

Self Protecting

Automatic shutdowns prevent potential damage to critical components

Stand-Alone

Isolated from grid in voltage mode

Peak Shaving (Aug 00)

Closed loop kWh meter controls for peak shaving or automatic timer controls for peak shaving.

Automatic Back-Up Power (Aug 00)

Grid sensing for automatic back-up power dispatching

Multi-Unit Parallel and Stand Alone (Dec 00)

Parallel and islanded load sharing between multiple units

Auto Grid to Stand Alone Transition

Operation in grid mode, unit transitions to stand alone operation

ETL Listed

Nationally recognized test laboratory safety rating for specific configurations



* May require external transfer switch for certain applications



performance specifications

No matter what standards you use to evaluate power systems – total operating power cost, installed cost per kW, choices of fuel, environmental considerations – the Parallon 75 is clearly a great choice. The Parallon 75 offers the best cost benefits: low initial cost, low operating rates, and minimal maintenance costs. Since it was designed from the ground up by Honeywell, it delivers the most advanced benefits technology can offer, with more than 40 years of patented research and development behind it. The environmental benefits are just as important: the Parallon 75 is designed to operate with up to 75% lower emissions than conventional gas turbines or diesel engines, and when using it for cogeneration, it has incredibly low greenhouse gas emissions. Plus, it runs quietly (less than 65 dBa at 10 meters), with virtually no vibration.

terms you will hear a lot of in the future

distributed generation

The concept of generating power on-site, at the point of use.

Parallon 75 Benefits From Proven Technology

AIR BEARINGS	No need for lubrication or oil changes High reliability 40 years experience with patented Honeywell technology
PERMANENT MAGNET GENERATOR	Eliminates need for gear box High efficiency 30 years experience with patented Honeywell technology
RECUPERATOR	Provides low fuel consumption resulting in higher efficiency
COMBUSTOR	Lean pre-mix combustor burns very lean fuel/air mixtures, resulting in low emissions (Liquid fuel combustor will also be available)
INVERTER	Produces required electrical frequency and output voltage with high efficiency.

PARALLON 75 SPECIFICATIONS AT STANDARD ISO CONDITIONS

MAXIMUM POWER AT ISO CONDITIONS (59° F AND SEA LEVEL)	75 kW continuous rating at inverter output (excludes transformer and gas compressor).
THERMAL TO ELECTRICAL EFFICIENCY (INCLUDING AUXILIARIES, LESS GAS PUMP AND TRANSFORMER)	28.5% target 27.5% guaranteed minimum at maximum power ISO conditions at minimum heat content of 19,500 Btu/lbm/LHV
OUTPUT VOLTAGE	Options for 120/208, 230/400, 240/415, 277/480, 360/600 – 3-phase 4-wire (with optional transformer), 50 to 60 Hz. Single phase operation must be balanced within 10%.
DIMENSIONS	Approximately 92” (2334 mm) L x 85” (2163 mm) H x 48” (1219 mm) W.
WEIGHT transformer and battery.	Approximately 2850 lb (1295 kg), not including optional gas compressor,
FUEL CONSUMPTION	1000cfh or 9.5 Therms per hour.
FUEL PRESSURE	90 psia minimum for natural gas.
START UP	Cold to full load: 4 minutes.
NO _x EMISSIONS AT 15% O ₂	<50 ppm Full power 59°F, sea level.
NOISE	65db per ANSI 133.8 at 10 meters.
DESIGN LIFE	Under normal operating conditions and adherence to Honeywell’s scheduled maintenance program, you can expect a minimum system life of 40,000 hours or 10 years whichever occurs first (minimum 10,000 hour combustor core life). Performance degradation is similar to a gas turbine of comparable design. Depending on the frequency and severity of the stand-alone step loads, and i harsh environmental conditions, life may be adversely impacted.



PARALLON 75 SPECIFICATIONS AT STANDARD ISO CONDITIONS

POWER QUALITY

- Minimum requirements include, but are not limited to:
 - Frequency output (nominal): 50 to 60 Hz
 - Frequency operating tolerance: +/- 5%
- Operating output voltage, 3-phase L-L: 275V
 - Operating tolerance, grid mode: +15%/-20%
 - Operating tolerance, stand-alone mode: +/- 5%
- Maximum transient surge voltage: 4 kV for 8 microseconds
- Transient resistive load voltage response limits:
 - 50% power step: -12% to +8%
 - Recovery time: 50ms to within +/-2% of steady state
- Steady state output:
 - 75 KVA Between +0.75 to -0.75 PF (with a factor command tolerance of +/- 0.05)
- Harmonic current at 75 kW:
 - Unity PF in grid mode (current wave harmonics) and nominal output voltage in stand-alone mode (voltage wave harmonics) at Parallon 75 output (including internal transformer, if installed):
 - Maximum total distortion: 5%
 - Maximum single harmonic: 3%
- Permissible three-phase load balance: +/- 10% of 3-phase average
- Output circuit:
 - 3-wire inverter output
 - 275 volts, 3-wire
 - Electromechanical contact for primary output
- Protection circuits (user adjustable trip points)
 - Over/under frequency
 - Over/under voltage
- Automatic synchronization before grid mode operation

PARALLON 75 SPECIFICATIONS AT STANDARD ISO CONDITIONS

POWER ELECTRONICS	Able to automatically parallel and synchronize with the grid, with protective relay functionality incorporated.								
ENCLOSURE	Weatherproofed with full access panels designed for installation outdoors.								
COGENERATION	Operational package will produce approximately 90 kW thermal output (hot water), 338,000 Btu/hour.								
STANDARDS	<p>The Current Production Units will satisfy the applicable requirements of the following industry standards:</p> <table> <tr> <td>UL2200</td><td>UL795</td><td>NEMA</td><td>CSA C22.2</td></tr> <tr> <td>NFPA 70</td><td>IEEE 519</td><td>ANSI 133.8</td><td></td></tr> </table>	UL2200	UL795	NEMA	CSA C22.2	NFPA 70	IEEE 519	ANSI 133.8	
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NFPA 70	IEEE 519	ANSI 133.8							
CERTIFICATION	ETL marks to be applied per Intertek Testing Services NA Inc. under the conditions set forth in the Limited Production Certification Agreement (certification report number J99028738-010). Certification code may require external protection.								
OPERATIONAL RANGE	-20°F to 120°F sea level to 10,000 ft. altitude.								



WARRANTY

- The Parallon 75 product and optional attachments are warranted against defects in materials and workmanship for a period of 12 months from date of commissioning, not to exceed 18 months from sales invoice date, unlimited hours of use within that period, subject to warranty agreement.

Parallel Power™ Power generated by a system operating side by side with the power grid — like the Parallon 75. This power gives you significant savings and is always reliable.

terms you will hear
a lot of in the future



MAINTENANCE AND OTHER SERVICES

- Full Maintenance and Overhaul Service Contract (\$/kWh)
- Flex Scheduled Maintenance Service Contract (\$/interval)
- Maintenance and Repair Service (time and materials)
- Remote Monitoring and Reporting Capabilities
- Installation Coordination and Commissioning Services

MAINTENANCE SCHEDULE

5,000 HOUR SERVICE

ITEM	INSPECT AND CLEAN	REPLACE/RECONDITION
Ignitor Lead	✓	
Cooling System Air Filter	✓	
Cooling System Oil	✓	
Fuel Filter		✓
LPU Air Filter		✓
Power and Control Electronics	✓	
Gas Compressor Assembly, Minor	✓	
Co-Gen Module	✓	

10,000 HOUR SERVICE

Engine Core Exchange		✓
Cooling System Air Filter		✓
Combustor Assembly		✓
Recuperator	✓	
Ignitor		✓
Exciter and Lead		✓

20,000 HOUR SERVICE

Ignitor Excitor		✓
Gas Compressor Assembly, Major		✓

COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL USERS

In business, success depends on a reliable supply of electricity. Whether a business or institution is located in the middle of a large city, or miles away from the closest town, the Parallon 75 provides users with a reliable and economical power source. With its 75 kW rating, the Parallon 75 can be used to deliver all the energy needed for your organization. For larger applications, multiple units can be clustered to work together to supply up to 600kW. Whatever your power needs, you can use the Parallon 75 in the way that best fits your business. As a stand-alone or parallel source of power (we call it Parallel Power) connected to the grid, the Parallon 75 provides low cost electricity and reliable backup.

standby power The assurance of having a system in place that can deliver full power to your business when unexpected outages occur.

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RURAL USERS

For a number of reasons, most rural areas pay a premium for electricity. To begin with, it is usually far too expensive to build a central power plant in a remote region where it serves only a small population base. Instead, central facilities are usually built near dense urban areas. Then the power is delivered to the outlying areas by a single high-voltage transmission line. The high cost of these power lines is usually covered by only a few customers and as usage increases the voltage can sag, causing power interruptions and equipment damage. To make things worse, if this single power line goes out, the entire area is cut off. The costs of these outages can mount up quickly. And popular alternatives present their own problems: diesel generators have high maintenance requirements, and solar panels are very expensive. For these reasons, the Parallon 75 is an ideal solution. It can use any number of locally available fuels – natural gas, diesel fuel, kerosene or propane – to generate low-cost, dependable energy right in the area where it is needed. With a minimum system life of 40,000 hours, this is a system that small rural businesses – and small communities – can depend on to deliver a steady source of city-grade, high quality electricity at costs that can be much lower than other alternatives. Ultimately, the Parallon 75 can enhance the quality of life for rural customers.



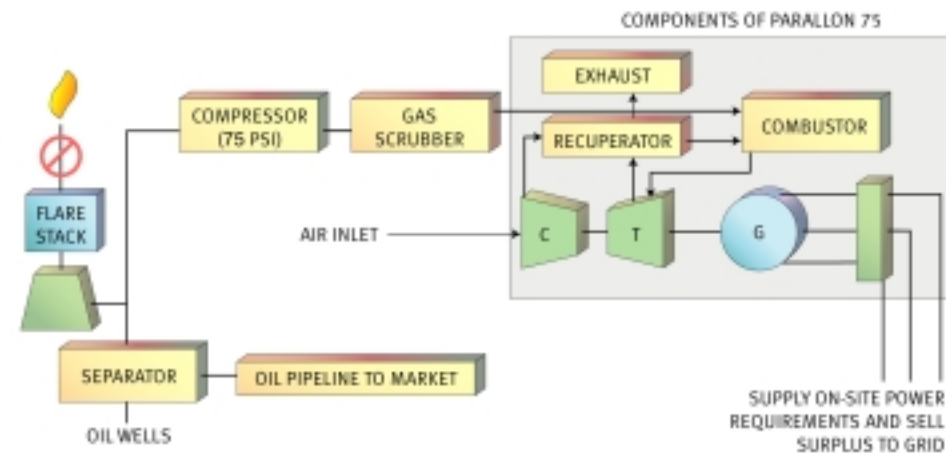
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distributed power The concept of generating power on-site, at the point of use.

FLARE GAS

Imagine a technology that can turn waste gas streams into useful energy, reduce greenhouse gas emissions and save money at the same time. This is exactly what the Parallon 75 is designed to do. For example, in oil production where small volumes of gas are difficult to conserve, it is a common practice to flare this gas, which wastes useful energy. This usually results in combustion efficiency lower than 85%. But the Parallon 75 can burn this same gas with over 99% combustion efficiency, and reduce on-site greenhouse gas emissions by at least 50% on a CO₂ equivalent basis. Since this waste gas is used for energy instead of burning additional fossil fuels at a central power plant, the Parallon 75 reduces greenhouse gases even further. Companies who reduce emissions this way demonstrate a serious commitment to the environment and may save money at the same time. Since flare gas is a waste by-product of oil production, fuel costs are nil. The electricity that is created can be used to power an oil field's on-site facilities or sold to customers on the local power grid. The Parallon 75 helps in other ways. In remote locations, where distribution lines are too difficult or very expensive to build, the Parallon 75 is an ideal source of dependable primary power. In addition to a primary power source, it can act as a backup generator, and save revenue that is lost every year due to power outages. Even smaller oilfield operations can enjoy these economic and environmental benefits with the Parallon 75's ability to operate with gas streams as small as 300 cubic meters per day.

TYPICAL FLARE GAS CONFIGURATION



VALUE PROPOSITION

The Parallon 75® value proposition in the U.S. market is a four component incremental proposition. The four value-building components are as follows:

Value Proposition Matrix



...plus others as we continue to develop additional features and functionality.

VALUE ASSOCIATED WITH OUTAGE RISK MITIGATION - V_{ORM}

Outage Risk Mitigation involves having back-up or standby power generation on-site that provides business assurance in the event that grid power is temporarily lost. Back up or standby generation allows the business to continue operating without utility grid power. In doing so, the business opportunity, operation productivity and in- process production or perishable goods are both maintained and captured. The estimated outage cost of a typical grocery store is shown in the table. A grocery store would install on-site generation to avoid risking the losses that could result from outage.

SAMPLE STORE ESTIMATED OUTAGE

Square Foot	75,000
Annual Report	\$25,000,000
Monthly	\$2,083,333
Perishable Goods 2 Hours	2%
Perishable Goods 5 Hours	5%
Loss Resulting from Spoilage 2%	\$41,667
Loss Resulting from Spoilage 5%	\$104,167
Average Loss	\$72,917
Probability of Outage	20%
Estimated Annual Spoilage Cost from Outage	\$14,583

Other Losses To Consider

2 Hour Outage Loss of Business Opportunity	\$1,522
2 Hour Outage Loss of Employee Productivity	\$228

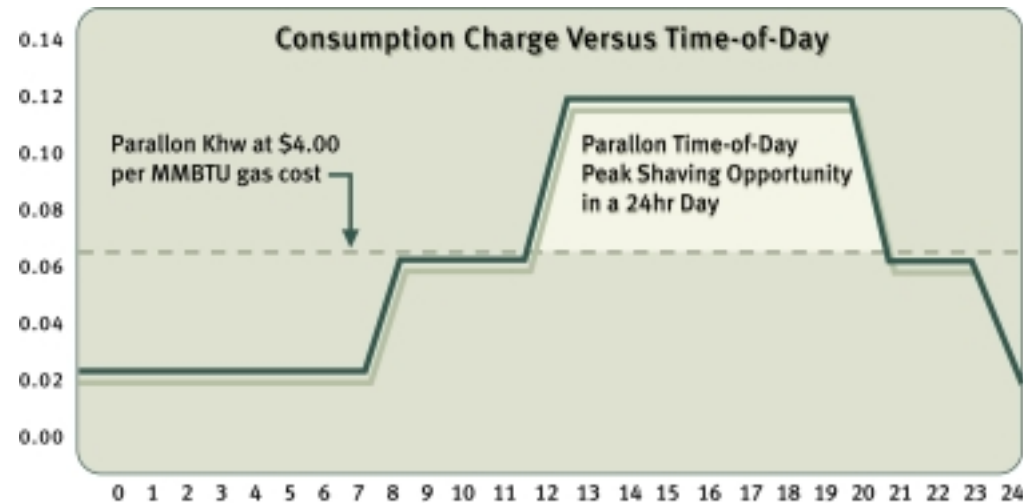
Estimated Annual Loss from Operation Due to Outage	\$16,334
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baseload power Using the output of a power source at its full and continuous rating. For the Parallon 75, that rating is 75kW, enough to supply all the power needs of a business from approximately 50kW to 600kW.

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VALUE ASSOCIATED WITH PEAK SHAVING AND ON-SITE GENERATION - V_{PS}

Electricity and gas utility rate structures are designed around two tariff rate components: demand and consumption. The demand charge is a Peak Kilowatt use charge applied monthly. The consumption charge is a Kilowatt per hour charge and is normally applied in a 24-hour period, as peak, shoulder and off peak usage. The Parallon's remote programming features of time of day operation and load following/ grid parallel operation enable the user to sense utility peak demand and dispatch the Parallon unit to provide on-site power when it is economically advantageous. Through the use of Parallon power, a user can reduce the demand peaks seen by the utility or they can use on-site power to operate within the 24-hour day when consumption rates are above the Parallon Kilowatt per hour cost. The chart is an example of a Parallon opportunity where time-of-day use is important. The chart shows how utility rates change during the day and where the Parallon advantage can be captured (the example tariff is for a utility in Arizona).



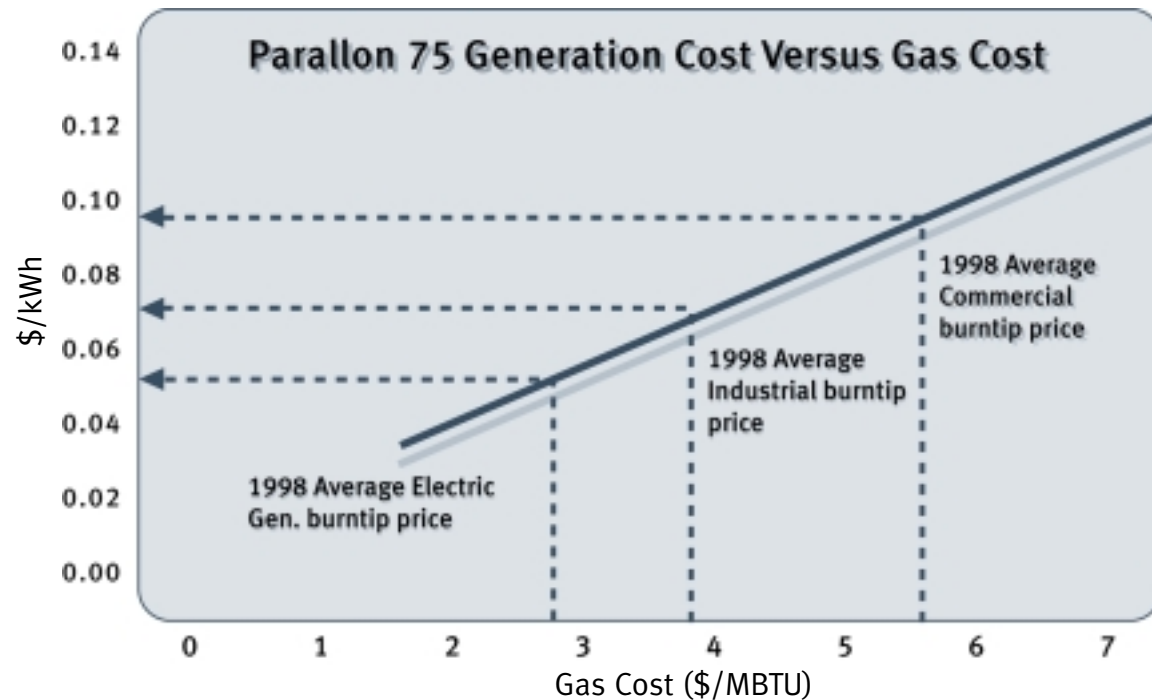
peak shaving During high demand periods, energy rates peak. Because the energy produced by a Turbogenerator power system is typically less expensive, businesses can seamlessly switch to this more efficient source whenever needed.

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VALUE OF GAS ALLIANCE - V_{GA}

Additional value can be gained in an alliance with natural gas utilities providing gas to operate the Parallon 75.

Traditionally, gas utilities have offered the best commodity and transport rates to electricity generating base load users of their system. Installation of Parallon power systems in the territory of a gas Local Distribution Company (LDC) creates substantial gas consumption growth in that territory. One Parallon 75, on a six-hour per day peak usage, consumes about the same amount of gas as can 70 to 140 residential customers. The graph shows the more favorable commodity and transport price offered to electrical generators that use gas as a fuel source, relative to prices offered to other commercial segments.



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portable power Power generation systems that can easily be transported to different sites.

VALUE OF COMBINED HEAT AND POWER - V_{CHP}

The fourth component of value is obtained by using the available exhaust heat of the Parallon 75. The Parallon has exhaust heat of about 460 degrees F. Honeywell has designed a heat recovery unit for the Parallon to capture this heat and provide hot water to its users. In conjunction with its suppliers, Honeywell is designing and developing other product options to use the available heat:

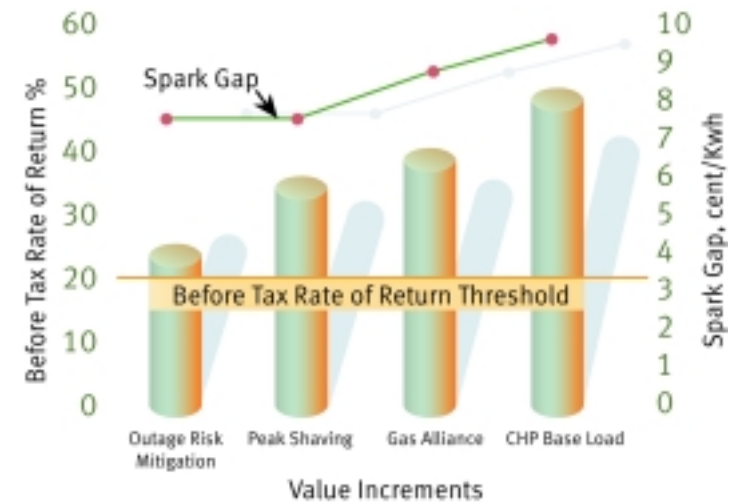
- * Heat supplemented (100) ton absorption chiller, double effect
- * Supplemental boiler
- * Desiccant interface and control
- * Air-to-air heat exchanger

For a fraction of the original investment, customers requiring some form of heat in their operation have the opportunity to realize two times the unit base operating efficiency (from 28.5 % up to 70% in CHP mode) and associated savings.

The chart is an example case of incremental benefits of all four-value components. It shows the additive components of the unit at the retail installed cost versus before tax rate of return and spark gap.

Turbogenerator power system We call ours the Parallon 75. It's one of the most technologically advanced of the microturbine power generation systems.

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AVAILABLE OPTIONS

Digital Control Unit Option

The DCU is a microprocessor-based electronic device which displays operating data and maintenance data, facilitates diagnosis and troubleshooting, and permits user-prompted information gathering and Parallon 75 programming. It is also password protected.



Gas Compressor Option

The Gas Compressor Option provides safe, efficient pressurized natural gas for those Parallon 75 sites where gas supply pressures are below 75 PSIG.

Black Start Option

The Parallon 75 turbogenerator provides convenient, clean, and efficient standby power, if power grid is unreliable or unavailable.

For more information regarding Base Unit and Option Pricing, please call any of the telephone numbers listed below.

1.800.406.2267

The distributors listed here have demonstrated the highest level of expertise about the special energy characteristics of your region. They have a thorough knowledge of our Parallon 75. By combining these two strengths, they can create the strongest link between the benefits we offer and the unique needs of your region. To learn what the Parallon 75 can do for you, contact the distributor for your region. If a distributor is not listed for your region, please contact [Honeywell](#) directly.

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INDIA (Government)

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AMANDLA - HONEYWELL POWER SYSTEMS LTD.

Contact Honeywell Regarding Distribution in Other Regions.

cogeneration Capturing the exhaust heat created by the power generation process, then using it to heat water, heat buildings, or as a second source of energy.

terms you will hear a lot of in the future